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## DEPARTMENTS.

## SOLUTIONS OF PROBLEMS.

## ALGEBRA.

NOTE.—Thomas S. Clarkson remarks that the solution of 321 does not satisfy the conditions of the problem, since the whole number of shares is not to exceed 200. He contends that the problem is impossible as stated, and suggests that it may have been intended that each man's share is not to exceed 200. We think the problem is stated as intended and is therefore impossible.

ED. F.

## 325. Proposed by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

I have a chronometer whose rate is uniform. When it indicates  $t_1$  time at Washington I find that it is  $h_1$  hours slow. I take it to Philadelphia and when it indicates  $t_2$  time, the local time of Philadelphia is  $h_2$  hours faster. I bring my chronometer back to Washington and find that when it indicates  $t_3$  time it is  $h_3$  hours slow. If  $t_1 = 5$  A. M.,  $t_2 = 7$  hours, 54 minutes,  $t_3 = 11$  hours, 46 minutes A. M.,  $h_1 = 1$  hour,  $h_2 = 1 \frac{203}{900}$  hours,  $h_3 = 1 \frac{7}{30}$  hours, find the difference of longitude between Washington and Philadelphia.

Solution by J. EDWARD SANDERS, Weather Bureau, Chicago, Ill, and the PROPOSER.

$$(h_3 - h_1)/(t_3 - t_1) = \text{error for one hour.}$$

$$(t_2 - t_1)(h_3 - h_1)/(t_3 - t_1) = \text{error at time } t_2 \text{ in Philadelphia.}$$

$$\therefore h_1 + t_2 + (t_2 - t_1)(h_3 - h_1)/(t_3 - t_1) = \text{time at Washington.}$$

$$h_2 + t_2 = \text{time at Philadelphia.}$$

$$h_2 + t_2 - h_1 - t_2 - (t_2 - t_1)(h_3 - h_1)/(t_3 - t_1) = \text{difference of time between the two cities} = T.$$

$$\therefore T = \frac{h_2(t_3 - t_1) + h_3(t_1 - t_2) + h_1(t_2 - t_3)}{t_3 - t_1}.$$

$$15T = L = \text{difference in longitude.}$$

$$\therefore L = \frac{15(h_1 t_2 + h_2 t_3 + h_3 t_1 - h_1 t_3 - h_2 t_1 - h_3 t_2)}{t_3 - t_1}.$$

Putting  $h_1 = 1$  hour,  $h_2 = 1 \frac{203}{900}$  hours,  $h_3 = 1 \frac{7}{30}$  hours,  $t_1 = 5$  hours,  $t_2 = 7$  hours 54 minutes,  $t_3 = 11$  hours 46 minutes, we get

$$L = 1 \frac{1}{60}^{\circ} = 1^{\circ} 53'.$$

Also solved by T. S. Clarkson.

## 326. Proposed by R. D. CARMICHAEL, Princeton University.

Is the series, of which the  $n$ th term is  $\frac{1.3.5.7\dots(2n-1)}{(n+1)! 2^n (2n+3)}$  convergent? If so, find its sum.